



United States Environmental Protection Agency

One Congress Street, Suite 1100 (HBT)
Boston, MA 02114-2023

June 17, 2003

Mr. Fred Evans
Engineering Field Activity-North East
10 Industrial Highway
Code 1811/FE - Mail Stop 82
Lester, PA 19113-2090

Re: *"Interim Ground-Water Sampling Event (IGWSE) 02 - January 2003 (Site 03), Naval Construction Battalion Center, North Kingston, Rhode Island,"* dated May 2003, former Naval Construction Battalion Center, North Kingston, Rhode Island

Dear Mr. Evans:

Pursuant to § 7.6 of the Davisville Naval Construction Battalion Center Federal Facility Agreement dated March 23, 1992, as amended (FFA), the Environmental Protection Agency (EPA) has reviewed the subject document and our comments are enclosed. We would like to meet to discuss the Navy's draft responses to these concerns prior to receipt of formal responses to these comments.

EPA had previously requested a synoptic quarterly water-level measurement program, including all available wells and piezometers in this area, should be initiated at the earliest possible date. The effort should also include collection of surface water elevation data at relevant surface water bodies (e.g., Davol Pond, Allen Harbor, wetlands north of site 03/04, etc.), which may act as both recharge and/or discharge areas). We mentioned that after sufficient time (e.g., a one to two year period of quarterly monitoring), a reasonable understanding of the system at the larger scale should be possible. EPA has not yet seen the maps generated by these events that were agreed to in principle by the Navy at various meetings. Will the Navy provide this information?

Please contact me at (617) 918-1384 to set up a meeting to discuss these issues as further described in the enclosure.

Sincerely,

A handwritten signature in cursive script, appearing to read "Christine Williams", is written over the typed name.

Christine A.P. Williams
Remedial Project Manager
Federal Facilities Superfund Section

Enclosure

cc: Richard Gottlieb, RIDEM
Bill Brandon, EPA
Marilyn Cohen, ToNK
Howard Cohen, RIEDC
Anne Heffron, Enviro-Tech
Kathleen Campbell, CDW
Jim Shultz, EA Engineering, Science and Technology

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GENERAL COMMENTS

1. Overall, the Interim Groundwater Sampling Event 02 provides the information that was outlined in the Interim Groundwater Sampling Event Program. However, EPA still retains concerns as to the adequacy of the groundwater sampling program and the potential limitations of the program to define actual long-term groundwater trends. This is important both to support a natural attenuation remedial alternative, and to ascertain that there is not a near present or future threat to potential down gradient receptors. Therefore, several comments are provided relative to several of the observations and conclusions provided in the report.

Previous investigations at the PR-58 Nike Site conducted by the Navy have described what appear to be two "arms" or branches of contamination emanating from the identified release area (presumed to be in the vicinity of MW03-14). One trends northeast along a delineated fracture zone toward and through the locations of EA104D/R and MW Z3-1 toward EA 112D/R/R2. The second extends to the east, southeast through MW03-13D and MW03-08D/R. However, the groundwater sampling and analysis that is currently being conducted in the bedrock along these two pathways under the efforts of this program is limited.

The northeast pathway lies in the direction of identified private groundwater wells along Fletcher Road. Given that the chlorinated volatile organic compounds (CVOC) identified have densities greater than water it is reasonable to presume that there is a tendency for these constituents to sink. The present monitoring program provides for no groundwater sampling in the bedrock along this pathway and even sampling of the deep overburden is limited to MW Z3-01, on the edge of the identified arm. EPA has previously recommended that additional monitoring occur along this pathway as part of the program. This included EA-112D/R/R2, which has previously exhibited contaminants. However, given the Navy/State ownership issues, EPA understands that it is highly improbable that the Navy would include this area in their monitoring program. For the greater good of scientifically monitoring the plume, the Navy and the State (Army Corps of Engineers) should cooperate with a comprehensive monitoring program.

While trends cannot be definitely ascertained yet, the concentrations of CVOC contaminants in MWZ3-01 do not seem to be declining. This sampling event report provides no assessment regarding the potential for contaminants moving along this inferred pathway to impact the private water supply wells. Specifically, there is no information on groundwater quality in the bedrock or on likely contaminant transport rates. In addition, there is no information on whether this fracture zone is linked to the private water wells via rock fracture sets.

The second identified "arm" of contaminant transport is toward the southeast. Like the northeast component of flow, no long-term CVOC trends in groundwater can be definitively made at this

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point. However, also like the northeast "arm," the concentrations of CVOC constituents do not seem to be declining. Based upon the hydraulic conductivity data for the deep overburden wells, the hydraulic gradients provided in this and the previous monitoring report, groundwater and contaminants may migrate relatively slowly in the deep overburden. There is though, an absence of hydraulic conductivity data for the bedrock along this "arm" of contaminant migration. This is due to a lack of bedrock monitoring wells between MW03-08R and EA-110R. The concern previously expressed by EPA remains that CVOC constituents may migrate vertically downward and migrate much more rapidly than in the overburden. The Navy is more in control of the area of this southeast "arm" and could install (and monitor) additional deep overburden and rock wells to close this data gap.

2. This Interim Groundwater Sampling Event report also expresses the interpretation that there is not a discernable trend in hydraulic gradient between the deep overburden and bedrock wells. However, vertical migration of CVOC compounds can occur without a significant downward vertical gradient. Nonetheless, even with the limited number of deep overburden and deep bedrock well pairs, distinct periods of downward vertical gradients have been recorded. Furthermore, review of the screened intervals for the monitoring well pairs that do exist reveal significant limitations to being able to ascertain the magnitude of vertical gradients.

The bedrock components have 25 feet long open intervals while the deep overburden screens are 10 feet long. The relatively long open interval of the bedrock wells is likely to smooth or reduce actual gradients in the deeper portion of the rock interval screened. The difficulty of obtaining vertical gradients is also compounded by the relative location of the screens. The deep overburden screen and the bedrock open interval do not have significant separation for their screen/open interval length. For the four well pairs surrounding the southeast "arm" of contamination (MW02-08D/R, MW03-03D/R, EA111D/R, and EA110D/R), the separation distances are only 8.2, 12.5, 0.5, and 3.0 feet, respectively.

3. Lastly, it is not entirely clear that the MW03-14 area is the only, or even the major source of the observed CVOC contamination that is flowing across the Navy Site 03. Review of the groundwater contours provided in this report strongly point to a source area that lies to the north of the presumed release area in the vicinity of monitoring wells EA-102 and MW03-14. The origin of the groundwater appears to lie in the vicinity of either Building 378 or the "triangle-shaped" area north of Building 378. The groundwater contours suggest that the area to the north of EA-102 and MW03-14 may intermittently be a significant recharge area. This area may intermittently raise groundwater levels significantly to result in radial flow from the vicinity of MW-Z3-01. As a result, CVOC contamination released in this vicinity can be pushed to the south in the vicinity of EA-102 and MW03-14.

Also, review of the groundwater contours provided in this report suggests that the primary direction of groundwater flow and contaminant migration from the EA-102 and MW03-14

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locations is to the southeast moving cross gradient around the Navy Site 03 area. It should be noted that previous investigations have not resulted in a defined release area for the CVOC contamination. To that extent, the conceptual model for groundwater flow and contaminant migration remains less than optimal.

SPECIFIC COMMENTS

4. *Page 9 of 13, 1st Bullet:* Review of Figures 3A and 3C actually appear to show that groundwater in the deep zone flows across the Navy Site 03 from the northwest to the southeast. The origin of this groundwater appears to be what is an open "triangular" area delineated by an apparent road. This area lies to the northeast of the MW03-14 area. These groundwater flow directions strongly suggest a release area that is not associated with the MW03-14 area. These contours and the absence of a defined surface release area in the vicinity of the MW03-14 area suggest that the MW03-14 area may not be the, or the only location, for the CVOC release. Since dense, non-aqueous phase liquid (DNAPL) can migrate in various directions including against prevailing groundwater flow directions, and the site hydrogeology is very complex, there is the possibility that what is observed in the vicinity of MW03-14 and EA-102 is derived from another location, possibly the "triangular" area noted above.

5. *Page 9 of 13, 2nd Bullet:* Review of Figure 3D shows groundwater flow in the bedrock to be strongly to the southeast across the Navy Site 03 from the northwest corner of the property. While the December 2002 (Figure 3B) groundwater flow in the bedrock appears to originate in the vicinity of EA-102 and MW03-14, the January 2002 groundwater flow appears to originate further to the north of that location.

6. *Page 9 of 13, Last Paragraph:* Contrary to this statement, review of the data does suggest a downward vertical gradient across portions of the site. There are times and locations where the gradient is vertically downward from deep overburden into the bedrock. In addition, as mentioned in the General Comments, the lengths of the bedrock open hole intervals and minimal separation distances between deep overburden and bedrock open hole interval mutes vertical hydraulic head differences. Further, there is an absence of bedrock monitoring along the interpreted major migratory pathway from MW03-08 to EA110. Nonetheless, MW03-08, EA111, and EA110 all aligned along that pathway, have exhibited strong downward vertical gradients over the ("4 to 5 sets of vertical hydraulic conductivity data").

In July 2000, MW03-08D/R had a downward vertical gradient of $-9.14\text{E-}03$. This is almost an order of magnitude greater than the average horizontal hydraulic gradient of $2.0\text{E-}03$. Also in July 2000, EA111D/R exhibited a similarly strong downward vertical gradient of $-9.04\text{E-}03$. In November 2001, EA110D/R exhibited a downward gradient of $-3.82\text{E-}03$, similar to the average horizontal gradient. Variability of vertical gradients may be expected. However, review of Table 5 shows that when downward gradients do occur, they are at times much stronger than the

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upward gradients when they occur. When combined with the construction of the well pairs (open interval separation, and screen/open interval length) it still suggests a downward migration into the bedrock. Furthermore, there is a complete absence of characterization of vertical gradients between MW03-08 and EA-110, a distance of almost 2,000 feet. This is a data gap to the monitoring program previously described by EPA.

7. Page 12 of 13, 1st Paragraph, Last Sentence: Based upon a review of the groundwater contours presented in this monitoring event report, it is not entirely convincing that the contaminated groundwater noted on the Navy Site 03 property originated primarily, or at least entirely, at the MW03-14 area. The contours presented suggest that there is a source in the vicinity of Building 378 or possibly the triangular area delineated by an apparent road near Perimeter Road and Seabee Avenue. While the presence of high concentrations of CVOC constituents in the groundwater at MW03-14 suggests DNAPL release at that location, there has been no documentation of a surface release at that location. Because of the migratory behavior of DNAPL, the origin of that material may be due to another release area.

The CVOC compounds of note appear to be primarily 1,1,2,2 Tetrachloroethane (1,1,2,2 TCA). This is a chemical that has been documented as being used and disposed of by the Navy in large quantities at other locations, i.e. Calf Pasture Point. The Army operated the Nike PR58 site for a limited period of time from the middle 1950's to 1962. The silos were not abandoned by drilling holes and filling until 1995. The solvents reportedly used did not include 1,1,2,2 TCA. Peabody Clean Industries operated between 1980 and 1982. A release at the Peabody Clean Industries location would most logically have involved chemicals/solvents other than 1,1,2,2 TCA. The Navy used the area for Disaster Recovery Training between 1964 and 1974. If the Navy used the Disaster Recovery Area for chemical recovery then there could have been large quantities of 1,1,2,2 TCA used and disposed of, and not necessarily directly at the delineated Disaster Recovery Training Area. The Nike PR58 and the Peabody Clean Industries operations do not appear to be primary candidates for release of large quantities of 1,1,2,2 TCA. However, since the Army Corps of Engineers has assumed responsibility for the contamination under the Formerly Used Defense Site program this is a mute point.

8. Page 12 of 13, 2nd Bullet: The monitoring well network is not adequate for the intended interim monitoring purposes. At a minimum, additional monitoring is needed along the northeast "arm" described toward the northeast along the direction of EA104, through MW-Z3-01 to EA112. An additional monitoring well pair is also needed between MW03-08 and EA110 along the southeast trending "arm". EPA understands the difficulty the Navy would have to monitor the northeast "arm", however, it is our opinion that the State/ACOE should be monitoring it. The Navy should have no difficulty in expanding the interim monitoring program to include additional wells along the southeast "arm".

9. Figures 3A and 3C: These figures show groundwater migrating across the Navy 03 Site from

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a location to the north of the EA-102 and MW03-14 presumed source area. This suggests another source. Also, extrapolation of the groundwater contours to the south suggest that if the EA-102 and MW03-14 area is the primary or sole release area for CVOC, there is almost no monitoring well coverage to the south and southeast of EA-102 and MW03-14. This is where the major direction of groundwater flow from EA102 and MW03-14 appears to flow.

10. Figure 3D: The groundwater flow directions presented on the figure do not indicate the EA102 or MW03-14 locations to be the source areas for the contamination noted on the Navy Site 03. This figure suggests that contamination originates in the vicinity of the "triangular area" delineated by an apparent road located to the southwest of MW-Z3-01. This figure also suggests the possibility of radial flow of groundwater from that location. It is possible that at least intermittently, during high groundwater this area serves as a recharge zone for groundwater into the south and southeast. If so, a release of CVOC in this area would have the potential to migrate to the south as well as the southeast, being manifested as the high CVOC concentrations in groundwater at EA102 and MW03-14.